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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF:

YASUO SUZUKI ET AL : EXAMINER: J. DOTE

SERIAL NO. 09/679,480

FILED: OCTOBER 5, 2000 : GROUP ART UNIT: 1753

FOR: ELECTROPHOTOGRAPHIC PHOTORECEPTOR AND ELECTROPHOTOGRAPHIC IMAGE FORMING METHOD AND APPARATUS USING THE PHOTORECEPTOR

DECLARATION UNDER 37 C.F.R. §1.132

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Now comes Yasuo Suzuki, the undersigned, who deposes and states that:

1. I am a graduate of Tohoku University and received my master degree in the year 1983.

2. I have been employed by Ricoh Company Limited for 15 years as a development engineer in the field of electrophotography.

3. I am an inventor in the above-identified application.

4. I have read and understand U.S. Patent 6,136,483 to Suzuki et al ("Suzuki").

5. In order to more clearly show the differences in black spot formation between the examples and comparative examples in the above-identified application and Suzuki's examples, the formulation and evaluation methods for the respective examples and comparative examples are described below in paragraphs 6-12.

6. Examples 8 to 15 of Suzuki

Substrate: a cylinder having a diameter of 80 mm and a length of 359 mm

(Undercoat layer)

Formulation: titanium oxide/alkyd-melamine resin

Solvent: methyl ethyl ketone

Thickness: 4.5 μm

Drying condition: 130 °C, 20 minutes

(Charge generation layer)

Formulation: asymmetric disazo pigment/τ-form metal-free phthalocyanine/butyral resin (S-lec BL-1) = 4/2/2.4 by weight

Solvent: cyclohexanone

Thickness: 0.2 μm

Drying condition: 130 °C, 10 minutes

(Charge transport layer)

Formulation: hydrazone compound (Examples 8 and 9)/Z-form polycarbonate = 7/10

stilbene compound (Examples 10 to 15)

Solvent: tetrahydrofuran

Thickness: 25 μm

Drying condition: 130 °C, 15 minutes

(Evaluation method)

Image forming apparatus: IMAGIO MF530

Environmental condition: 25 °C 50% RH

Original document: a chart having an image area of 5%

Number of produced copies: 50,000 sheets (successively produced)

Evaluation method of black spot: the number of copies in which a black spot of 0.1 mm or larger is present in an area of 1 cm^2.

7. Comparative Examples 5 and 13 in the Present Application

Substrate: a cylinder having a diameter of 30 mm and a length of 340 mm

(Undercoat layer)

Formulation: titanium oxide/alkyd-melamine resin

Solvent: methyl ethyl ketone

Thickness: 3.0 μm

Drying condition: 130 °C, 20 minutes

(Charge generation layer)

Formulation: asymmetric disazo pigment/τ-form metal-free phthalocyanine/butyral resin (S-lec BM-S) = 4/3/1.4 by weight

Solvent: cyclohexanone

Thickness: 0.2 μm

Drying condition: 130 °C, 10 minutes

(Charge transport layer)

Formulation: stilbene compound/Z-form polycarbonate = 7.5/10

Solvent: toluene

Thickness: 28 μm

Drying condition: 130 °C, 25 minutes

(Evaluation method)

Image forming apparatus: IMAGIO MF250

Environmental condition: 25 °C 50 %RH

Original document: a chart having an image area of 5 %

Number of produced copies: 50,000 sheets (successively produced)

Evaluation method of black spot: the number of copies in which a black spot of 0.1 mm or larger is present in an area of 1 cm^2

8. Black spots were not observed even in the 50,000th copy image in the Suzuki Examples, but black spots were observed in the 38,000th image (or 35,000th image) in the Comparative Examples of the present application. The reasons for this are discussed in paragraphs 9-12 below.

9. One reason is that the undercoat layer, which is thicker in the Suzuki Examples (4.5 μm) than in the present Comparative Examples (3.0 μm), has a charge blocking property. The thicker the undercoat layer, the better the black spot resistance.

10. More importantly, the reason for the difference in black spot formation is the difference in the respective photoreceptor diameters used in Suzuki and the present application. The diameter of the photoreceptors used in Suzuki is 80 mm, but the diameter of the photoreceptors used for the Comparative Examples in the present application is 30 mm. A-4 sized copies were used in both Suzuki and the present application, although this is not described in either the present application or Suzuki. With an A-4 sized copy, a length of about 27 cm is needed for each photoreceptor to produce one copy (i.e., 21 cm (width A-4 paper) + distance between the end of one copy and the beginning of the next copy).

11. Therefore, when the Suzuki photoreceptor (having a diameter of 80 mm) produces 50,000 images, it revolves about 53,742 times ((27 cm × 50,000)/(8 cm × 3.14)). In contrast, the photoreceptor used in the present application revolves about 143,312 times to produce 50,000 images, because it has a diameter of 30 mm. In other words, the surface of the photoreceptor having a diameter of 30 mm is exposed to hazards by a factor of 2.67 times greater than that of the Suzuki photoreceptor having a diameter of 80 mm. When black spots are observed from the 38,000th image in the Comparative Examples of the present application, it is nearly equivalent to black spots being observed from about the 100,000th image in the Suzuki Examples. Therefore it is reasonable that black spots are not observed even in the 50,000th image in the Suzuki Examples.

12. The evaluation conditions in the present application are more severe than those used in Suzuki, and this is the main reason for the difference in black spot formation. By using a sulfur-containing antioxidant in the photosensitive layer in accordance with the ptesent invention, the resultant photoreceptor has excellent durability.

13. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

14. Further deponent saith not.

Yasuo Suzuki
Signature

July 4, 2002
Date